The hydrocarbon may be, for example, a recycled oil, a rejuvenating oil, a hard asphalt, and/or a soft asphalt. The antistripping agent may be, for example, an amine and/or lime. The waste material may be, for example, roofing shingles, recycled tires, and/or glass. In some embodiments, the asphalt modifier comprises coal tar pitch.

[0013] In other embodiments, the solid petrochemical-containing scrap material includes polycyclic aromatic hydrocarbons (PAHs), such as pyrene, naphthalene, and anthracene. Non-limiting examples of substrates that include significant amounts of PAH include cigarette butts, incompletely combusted coal, incompletely combusted petrol, incompletely combusted wood, incompletely combusted tobacco, charbroiled meat products, incompletely combusted trash, or incompletely combusted organic material.

[0014] In a preferred embodiment, the solid petrochemical-containing scrap material (e.g., after a grinding process step) is broken down into pieces that optimize the surface area exposed to fungal culture, sterilizing agent, water and air. The pieces must be large enough to permit air to reach the fungal culture. The fungal culture will not grow without air.

[0015] In some embodiments, the solid petrochemical-containing scrap material (e.g., after a grinding process step) has a longest dimension (e.g., a longest edge length, or a diameter) not greater than about 5 inches, for example not greater than about 5 inches, not more than about 4.5 inches, not more than about 4 inches, not more than about 3.5 inches, not more than about 3 inches, not more than about 2.5 inches, not more than about 2 inches, not more than about 1.5 inches, not more than about 1 inch, not more than about 0.5 inches, or not more than about 0.25 inches. In some embodiments, the asphalt-containing construction scrap has a longest dimension of not more than about 1 inch. In some embodiments, the asphalt-containing construction scrap is ground to produce a ground substrate wherein each piece of the ground substrate has a longest dimension (e.g., a longest edge length, or a diameter) not greater than about 5 inches, for example not greater than about 5 inches, not more than about 4.5 inches, not more than about 4 inches, not more than about 3.5 inches, not more than about 3 inches, not more than about 2.5 inches, not more than about 2 inches, not more than about 1.5 inches, not more than about 1 inch, not more than about 0.5 inches, or not more than about 0.25 inches. In other embodiments, the solid petrochemical-containing scrap material is not ground but is instead processed using a method disclosed herein without a step of mechanically disrupting the scrap material prior to inoculation with the fungal culture.

[0016] The fungal culture may include any fungal species that is capable of colonizing an asphalt-containing substrate and converting the asphalt in the substrate to a biomass product(s). In some embodiments, the fungal species is selected from the group consisting of: *Agrocybe* spp., *Amanita* spp., *Armillaria* spp., *Auricularia* spp., *Cerrena* spp., *Coprinus* spp., *Cyathus* spp., *Daedalea* spp., *Daedaleopsis* spp., *Daldinia* spp., *Echinodontium* spp., *Exidia* spp., *Fistulina* spp., *Flammulina* spp., *Fomes* spp., *Grifola* spp., *Hericium* spp., *Heterobasidion* spp., *Hypsizygus* spp., *Inonotus* spp., *Lenzites* spp., *Marasmius* spp., *Phanerochaete* spp., *Pisolithus* spp., *Sparassis* spp., *Strobilomyces* spp., *Xylaria* spp., *Pleurotus* spp., *Ganoderma* spp., *Trametes* spp. *Schizophyllum* spp., *Irpex* spp. and *Lentinula* spp. *In some embodiments, the fungal* species is *Pleurotus ostreatus*, commonly referred to as the pearl oyster mushroom or the tree oyster mushroom.

[0017] In some embodiments, the fungal species is *Pleurotus pulmonarius*, commonly referred to as the Indian oyster mushroom, the Italian oyster mushroom, the Phoenix mushroom, or the lung oyster mushroom.

[0018] In some embodiments, the fungal species is *Ganoderma lucidum*, commonly referred to as the Lingzhi mushroom.

[0019] In some embodiments, the fungal species is *Trametes versicolor*, commonly referred to as the turkey tail mushroom, and also known as *Coriolus versicolor* or *Polyporus versicolor*. In some embodiments, the fungal species is *Pleurotus columbinus*, commonly referred to as the blue oyster mushroom. In some embodiments, the fungal species is *Pleurotus eryngii*, commonly referred to as the king trumpet mushroom, the French horn mushroom, the king oyster mushroom, the king brown mushroom, boletus of the steppes, trumpet royale, or the ali'i oyster. In some embodiments, the fungal tissue is a mixture of two or more fungal species selected from the group consisting of: *P. ostreatus, P. pulmonarius, G. lucidum, T. versicolor, P. columbinus*, and *P. eryngii*. In some embodiments, the fungal tissue is a combination of *Trametes versicolor* and *Pleurotus ostreatus*.

[0020] The growth medium can be any growth medium that enables stable growth of the fungal culture. In some embodiments, the growth medium includes a sawdust mixture. In some embodiments, the sawdust mixture includes alder sawdust, wheat bran, and/or gypsum. In some embodiments, the sawdust mixture includes 50-100% (v/v) alder sawdust, 0-50% (v/v) wheat bran, and 0-50% (v/v) gypsum. In some embodiments, the sawdust mixture includes 60-90% (v/v) alder sawdust, 10-20% (v/v) wheat bran, and 5-15% (v/v) gypsum. In some embodiments, the growth medium comprises a lignin-containing material, such as paper, a lignin-based polymer, a lignin-based concrete additive, a dyestuff dispersant, animal feed, a lignin-based industrial binder, a lignin-based oil well drilling additive, and/or cigarette filters (e.g., cigarette butts).

[0021] In some embodiments, the inoculum for the petrochemical-containing material is a block spawn, pelletized spawn, or other spawn delivery form (collectively, "block spawn") comprising a support material and fungal tissue (mycelium). The source of mycelium may be sawdust spawn, compost spawn, straw spawn, grain block spawn, a liquid inoculum (e.g., a liquid suspension of mycelium), mycelium-on-agar, a fruiting block, or any other substrate that can serve as a vector for mycelium. In some embodiments, the support material is an agricultural biomass, such as sugarcane bagasse, corncob, naturally occurring sponge, an agro-waste material, or a lignocellulosic material such as sawdust, straw, or cottonseed hull. In other embodiments, the support material is a non-naturally occurring material such as a synthetic foam (e.g., polyurethane foam).

[0022] A block spawn comprising an agricultural biomass support consistent with the present disclosure may be prepared by standard methods, for example, by removing any grain materials from the biomass, dividing the biomass (if necessary) into pieces approximately 1-2 inches in size, drying the biomass to a constant weight, optionally pasteurizing or sterilizing the biomass support material, and then inoculating the agricultural biomass support with a homogenized aqueous mycelium suspension.